

EXAM 2 REVIEW

1. $x \geq -4$



set-builder: $\{x | x \geq -4\}$

interval: $[-4, \infty)$

2. $x < 7$



set-builder: $\{x | x < 7\}$

interval: $(-\infty, 7)$

3.
$$\begin{array}{r} m-2 \geq -3 \\ +2 \quad +2 \\ \hline m \geq -1 \end{array}$$



set-builder: $\{m | m \geq -1\}$

interval: $(-1, \infty)$

4.
$$\begin{array}{r} -2n \geq 6 \\ -2 \quad -2 \\ \hline n \leq -3 \end{array}$$

divided by negative,
flipped sign

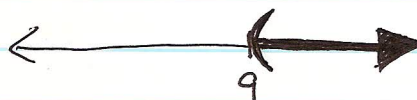


Set-builder: $\{n | n \leq -3\}$

interval: $(-\infty, -3]$

5.
$$\begin{array}{r} 4-t < -5 \\ -4 \quad -4 \\ \hline -t < -9 \\ -1 \quad -1 \\ \hline t > 9 \end{array}$$

divided by negative,
flipped sign



set-builder: $\{t | t > 9\}$

interval: $(9, \infty)$

6. $6(2b-3)+8 \leq 5(4b+2)-4$

$12b-18+8 \leq 20b+10-4$

$12b-10 \leq 20b+6$

$-12b-6 \leq -12b+6$

$-16 \leq 8b$

$\frac{-16}{8} \leq \frac{8b}{8}$

$-2 \leq b$

$b \geq -2$



set-builder: $\{b | b \geq -2\}$

interval: $[-2, \infty)$

7. $f(x) = \frac{x-6}{x^2+5x-14}$ denominator can't be zero.

$$x^2+5x-14 \neq 0$$

$$(x+7)(x-2) \neq 0$$

$$x+7 \neq 0 \text{ \& } x-2 \neq 0$$

$$x \neq -7 \text{ \& } x \neq 2$$

$$\begin{array}{r|l} -14 & 5 \\ 14, -1 & 13 \\ \hline 7, -2 & 5 \end{array}$$

$$\text{Domain: } \{x \mid x \neq -7, 2\}$$

8. $f(x) = \sqrt{2x-6}$ can't take square root of negative.

$$2x-6 \geq 0$$

$$2x \geq 6$$

$$x \geq 3$$

$$\text{Domain: } \{x \mid x \geq 3\}$$

9. $f(x) = \frac{5}{2x-3}$ Denominator can't be zero.

$$2x-3 \neq 0$$

$$2x \neq 3$$

$$x \neq \frac{3}{2}$$

$$\text{Domain: } (-\infty, \frac{3}{2}) \cup (\frac{3}{2}, \infty)$$

10. $f(x) = \sqrt{12-x}$ can't take square root of negative

$$12-x \geq 0$$

$$+x \quad +x$$

$$12 \geq x$$

$$x \leq 12$$

$$\text{Domain: } (-\infty, 12]$$

11. $P(x) = 0.25x - 3$ $P(x)$ = profit.
 x = # of items produced
 profit is at least \$5000

$$P(x) \geq 5000$$

$$0.25x - 3 \geq 5000$$

$$0.25x \geq 5003$$

$$x \geq 20,012$$

At least

20,012 items

12. $-3 < x \leq 4$  $(-3, 4]$

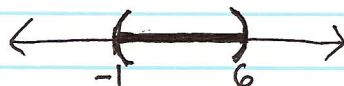
13. $x < 2$ or $x > 7$  $(-\infty, 2) \cup (7, \infty)$

14. $2x - 3 < 9$ and $3x + 4 > 1$

$2x < 12$ and $3x > -3$

$x < 6$ and $x > -1$

$-1 < x < 6$



set-builder: $\{x | -1 < x < 6\}$

interval: $(-1, 6)$

15. $2x - 3 \geq 5$ and $\frac{-3x}{-3} > \frac{9}{-3}$

$2x \geq 8$

$x \geq 4$

and

$x < -3$

← changed sign
because divided
by negative

There are no
numbers that

are both ≥ 4 and < -3 ,

so there is no solution.



set-builder & interval: \emptyset

16. $2(x - 8) < -14$ or $\frac{4x - 3}{3} > 7$

$2x - 16 < -14$

$2x < 2$

$x < 1$

$4x - 3 > 21$

$4x > 24$

$x > 6$

$x < 1$ or $x > 6$



set-builder: $\{x | x < 1 \text{ or } x > 6\}$

interval: $(-\infty, 1) \cup (6, \infty)$

17. $-4x - 2 < 10$ or $x + 7 > 9$

$-4x < 12$

$x > 2$

divided by
negative,
flipped sign →

$x > -3$

$x > -3$ or $x > 2$

The numbers > -3 or
 > 2 are simply the
numbers > -3 .



set-builder: $\{x | x > -3\}$

interval: $(-3, \infty)$

$$18. |x+5| = 2$$

$$x+5 = -2 \text{ or } x+5 = 2$$

$$x = -7 \text{ or } x = -3$$

$$\boxed{\{-7, -3\}}$$

$$19. 2|3x-1| + 4 = 10$$

$$2|3x-1| = 6$$

$$|3x-1| = 3$$

$$3x-1 = -3 \text{ or } 3x-1 = 3$$

$$3x = -5 \text{ or } 3x = 4$$

$$x = -5/3 \text{ or } x = 4/3$$

$$\boxed{\{-5/3, 4/3\}}$$

$$20. |x-3| = -2$$

Absolute value is never negative.

No solution $\boxed{\emptyset}$

$$21. \text{ Let } f(x) = |4x| - 5. \text{ Find all } x \text{ for which } f(x) = 3$$

$$|4x| - 5 = 3$$

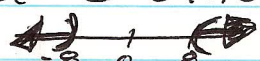
$$|4x| = 8$$

$$4x = -8 \text{ or } 4x = 8$$

$$x = -2 \text{ or } x = 2$$

$$\boxed{\{-2, 2\}}$$

$$22. \left| \frac{2y-4}{3} \right| > 8$$

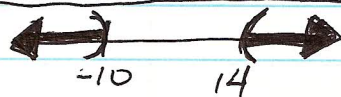
$\frac{2y-4}{3}$ is more than 8 units away from zero: 

$$\frac{2y-4}{3} < -8 \text{ or } \frac{2y-4}{3} > 8$$

$$2y-4 < -24 \text{ or } 2y-4 > 24$$

$$2y < -20 \text{ or } 2y > 28$$

$$y < -10 \text{ or } y > 14$$



$$\boxed{\{y \mid y < -10 \text{ or } y > 14\}}$$

$$(-\infty, -10) \cup (14, \infty)$$

23. $|2x-1| < 3$

$2x-1$ is less than 3 units

away from zero: 

$$-3 < 2x-1 < 3$$

$$-2 < 2x < 4$$

$$-1 < x < 2$$



$$\{x | -1 < x < 2\} \quad (-1, 2)$$

24. Let $f(x) = |x+10|$. Find all x for which $f(x) \leq 3$.

$$|x+10| \leq 3$$

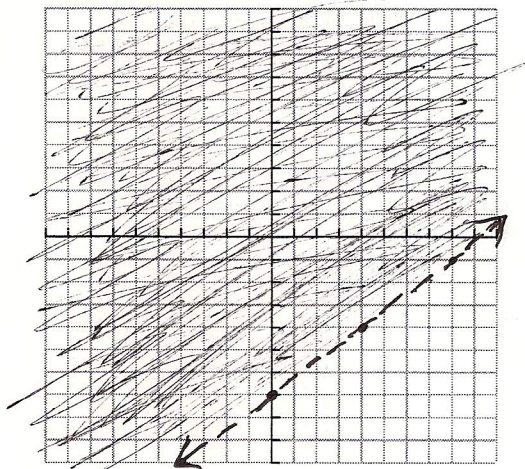
$$-3 \leq x+10 \leq 3$$

$$-13 \leq x \leq -7$$

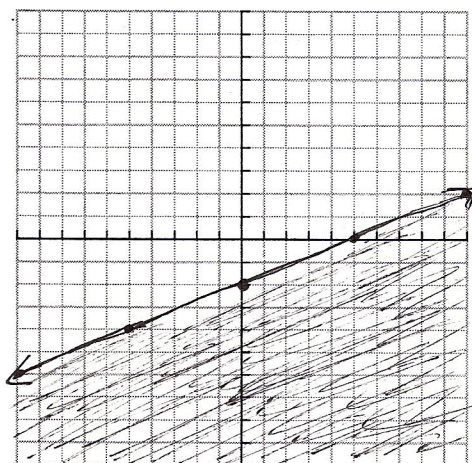


$$\{x | -13 \leq x \leq -7\} \quad [-13, -7]$$

25. $y > \frac{3}{4}x - 7$

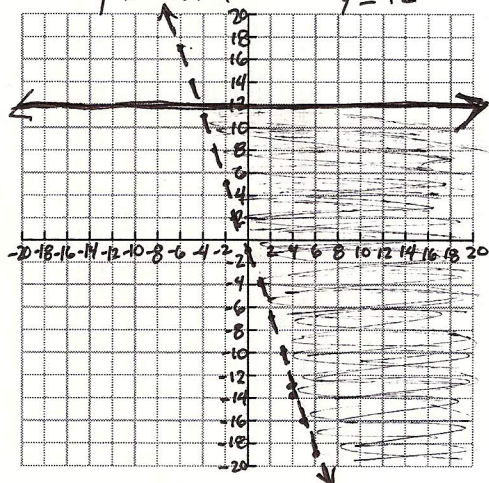


26. $2x - 5y \geq 10$ $\frac{-5y}{-5} \geq \frac{-2x+10}{-5}$

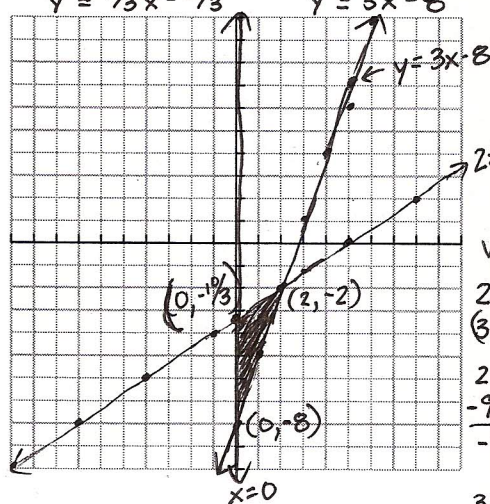


$y \leq \frac{2}{5}x - 2$
switch
sign
(divided
by negative)

27. $3x + y > -1$ $y > -3x - 1$
 $y - 5 \leq 7$ $y \leq 12$



28. $2x - 3y \geq 10$ $3x - y \leq 8$
 $-3y \geq -2x + 10$ $-y \leq -3x + 8$ $x \geq 0$
 $y \leq \frac{2}{3}x - \frac{10}{3}$ $y \geq 3x - 8$



vertices:

$2x - 3y = 10$
 $(3x - y = 8)(-3)$

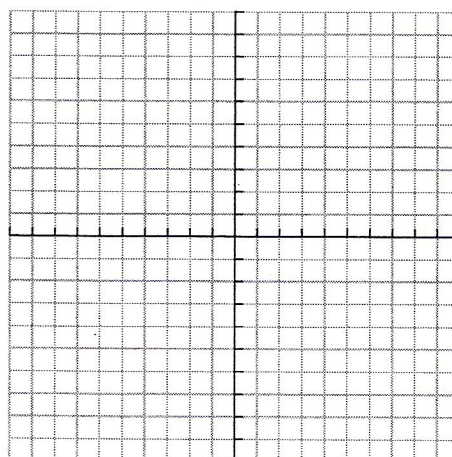
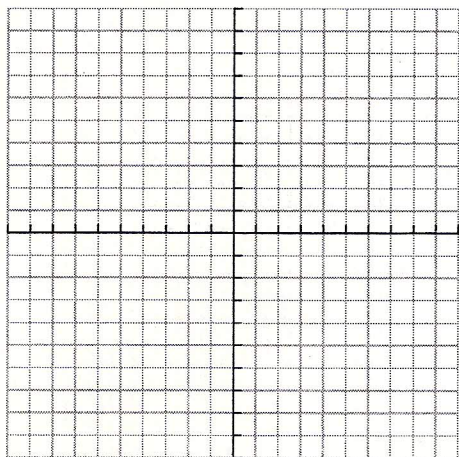
$2x - 3y = 10$
 $-9x + 3y = -24$
 $-7x = -14$

$x = 2$

$3(2) - y = 8$ $(2, -2)$
 $-y = 2$
 $y = -2$

$3x - y = 8$
 $x = 0$ $(0, -8)$
 $3(0) - y = 8$
 $y = -8$

$2x - 3y \geq 10$ $x = 0$
 $2(0) - 3y = 10$
 $y = -\frac{10}{3}$
 $(0, -\frac{10}{3})$



$$29. -2x^2 + 8x - 4$$

$$\boxed{-2(x^2 - 4x + 2)}$$

$$30. 3mn + 12mp - 27mr$$

$$\boxed{3m(n + 4p - 9r)}$$

$$31. 2x^3 - 6x^2 + 7x - 21$$

$$(2x^3 - 6x^2) + (7x - 21)$$

$$2x^2(x - 3) + 7(x - 3)$$

$$\boxed{(2x^2 + 7)(x - 3)}$$

$$32. y^2 - 5y - 36$$

$$\boxed{(y - 9)(y + 4)}$$

-36	-5
-36, 1	-35
-18, 2	-16
-12, 3	-9
<u>-9, 4</u>	-5

$$33. x^2 + 3x + 5$$

$$\boxed{\text{prime}}$$

5	3
1, 5	6

$$34. 8c^2 + 18cd - 5d^2 \quad (8)(-5) = -40$$

-40	18
40, -1	39
<u>20, -2</u>	18

$$8c^2 + 20cd - 2cd - 5d^2$$

$$(8c^2 + 20cd) + (-2cd - 5d^2)$$

$$4c(2c + 5d) - d(2c + 5d)$$

$$\boxed{(2c + 5d)(4c - d)}$$

$$35. 81t^2 - 36t + 4$$

$$(9t)^2 - 2(9t)(2) + (2)^2$$

$$\boxed{(9t - 2)^2}$$

$$36. 16m^4 - 81$$

$$(4m^2)^2 - 9^2$$

$$(4m^2 + 9)(4m^2 - 9)$$

$$(4m^2 + 9)[(2m)^2 - 3^2] = \boxed{(4m^2 + 9)(2m + 3)(2m - 3)}$$

$$\begin{array}{r}
 37. -6x^2 + x^4 - 27 \quad \begin{array}{r|l} -27 & -6 \\ \hline -27, 1 & -26 \\ -9, 3 & -6 \end{array} \\
 x^4 - 6x^2 - 27 \\
 (x^2 - 9)(x^2 + 3) \\
 \boxed{(x+3)(x-3)(x^2+3)}
 \end{array}$$

$$\begin{array}{r}
 38. v^2 - 10v + 25 - 4w^2 \\
 (v^2 - 10v + 25) - 4w^2 \\
 (v-5)^2 - (2w)^2 \\
 \boxed{(v-5+2w)(v-5-2w)}
 \end{array}$$

$$\begin{array}{r}
 39. k^3 - 27 \quad A^3 - B^3 = (A-B)(A^2 + AB + B^2) \\
 k^3 - 3^3 \quad A=k \quad B=3 \\
 \boxed{(k-3)(k^2+3k+9)}
 \end{array}$$

$$\begin{array}{r}
 40. 64x^3 + 125y^6 \quad A^3 + B^3 = (A+B)(A^2 - AB + B^2) \\
 (4x)^3 + (5y^2)^3 \quad A=4x \quad B=5y^2 \\
 \boxed{(4x+5y^2)(16x^2-20xy^2+25y^4)}
 \end{array}$$

$$\begin{array}{r}
 41. x^2 - 9x + 20 = 0 \\
 (x-4)(x-5) = 0 \\
 x-4=0 \text{ or } x-5=0 \\
 x=4 \text{ or } x=5 \quad \boxed{\{4, 5\}}
 \end{array}$$

$$\begin{array}{r}
 42. n^2 - 11n = -24 \\
 n^2 - 11n + 24 = 0 \\
 (n-8)(n-3) = 0 \quad \boxed{\{3, 8\}} \\
 n-8=0 \quad n-3=0 \\
 n=8 \quad n=3
 \end{array}$$

$$43. 2y^2 + 17y = 16y + 10$$

$$2y^2 + y - 10 = 0$$

$$2y^2 + 5y - 4y - 10 = 0$$

$$(2y^2 + 5y) + (-4y - 10) = 0$$

$$y(2y + 5) - 2(2y + 5) = 0$$

$$(2y + 5)(y - 2) = 0$$

$$2y + 5 = 0 \text{ or } y - 2 = 0$$

$$2y = -5 \text{ or } y = 2$$

$$y = -\frac{5}{2}$$

$$(2x-10) = -20 \mid 1$$

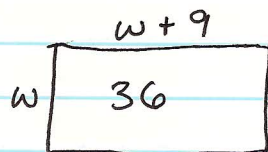
20, -1	19
10, -2	8
5, -4	1

$$y = -\frac{5}{2} \text{ or } y = 2$$

$$\boxed{-\frac{5}{2}, 2}$$

44. Length is 9 ft more than width

$$\text{Area} = 36 \text{ ft}^2$$



$$\boxed{\text{width} = 3 \text{ ft}}$$

$$w(w+9) = 36$$

$$w^2 + 9w = 36$$

$$w^2 + 9w - 36 = 0$$

$$(w+12)(w-3) = 0$$

$$w = -12 \text{ or } w = 3$$

$$45. h(t) = -16t^2 + 64t$$

(a) when object hits ground, $h(t) = 0$

$$0 = -16t^2 + 64t$$

$$\cancel{0 = -16t^2 + 64t} \quad 0 = -16t(t-4)$$

$$-16t = 0 \text{ or } t - 4 = 0$$

$$t = 0 \text{ or } t = 4$$

$$\boxed{4 \text{ sec}}$$

$$(b) h(t) = 48$$

$$48 = -16t^2 + 64t$$

$$-16t^2 + 64t - 48 = 0$$

$$-16(t^2 - 4t + 3) = 0$$

$$-16(t-3)(t-1) = 0$$

$$t = 3 \text{ or } t = 1$$

want time before

peaking

$$\boxed{1 \text{ sec}}$$

